Spring 2011

High Plains Herald

National Weather Service
1301 Airport Parkway
Cheyenne, WY 82001
307-772-2468
www.nws.gov/cys
cys.info@noaa.gov

The National Weather Service provides weather forecasts and warnings for the protection of life and property and the enhancement of the national economy.

Questions, comments, suggestions: give us your feedback by emailing us at cys.info@noaa.gov

Inside this Issue:

National Weather Service Open House

By Mike Weiland

On Wednesday, September 14th, 2011, your NWS office in Cheyenne will be hosting an open house. The open house will run from 2 PM to 7 PM at the office at 1301 Airport Parkway. Please plan to attend and see how we make forecasts, issue warnings and look at the equipment that we use. There will be many displays and staff will be on hand to discuss weather and our operations. More information on the open house will be coming out this summer, but mark your calendar now for this interesting event and meet some of the staff at your National Weather Service office.

Weather Spotter Training

By John Griffith

The effects of severe weather are felt every year by many people in southeast Wyoming and the Nebraska panhandle. To obtain critical weather information, the National Weather Service (NWS) in Cheyenne trains severe weather spotters. These volunteers help keep their local communities safe by providing timely and accurate reports of severe weather to the NWS.

The NWS encourages anyone with an interest in public service and access to communication, to become a spotter for their area. Volunteers include police and fire personnel, dispatchers, HAM radio operators, EMS workers, public utility workers, and other concerned private citizens. Individuals affiliated with hospitals, schools, churches, and nursing homes or who have a responsibility for protecting others are encouraged to become a spotter. Training is conducted by the Cheyenne office to any group that requests a class. Classes are free and typically are 90 minutes to two hours long. If you would like more information, please call John Griffith at 307-772-2468 ext. 726.

Day	City, State	Time	Location
6-Apr	Alliance, NE (Box Butte County)	7:00pm MDT	Fire Training Building
7-Apr	Douglas, WY (Converse County)	6:30pm MDT	Basement of Courthouse
11-Apr	Pine Bluffs, WY (Laramie County)	7:00pm MDT	Fire Station
13-Apr	Sidney, NE (Cheyenne County)	7:00pm MDT	Sidney High School
14-Apr	Fort Robinson, NE (Dawes County)	6:00pm MDT	Buffalo Barracks
18-Apr	Torrington, WY (Goshen County)	1:00pm MDT	Basement of Courthouse EOC Training Room
18-Apr	Torrington, WY (Goshen County)	6:30pm MDT	Basement of Courthouse EOC Training Room
19-Apr	Wheatland, WY (Platte County)	7:00pm MDT	Fire Training Facility
20-Apr	Cheyenne, WY (Laramie County)	6:30pm MDT	Laramie County Community College - Training Center Building Rooms 120/121
25-Apr	Laramie, WY (Albany County)	6:30pm MDT	Fire Station 3 2374 W Jefferson
26-Apr	Bayard, NE (Morrill County)	6:00pm MDT	Fire Station
27-Apr	Lusk, WY (Niobrara County)	6:00pm MDT	City Office

"On average more people are killed by flooding than any single hazard."

Inside this Issue:

Severe Weather Awareness

By Mike Jamski

With spring almost upon us, now is the time to recognize the dangers of thunderstorms and be prepared to take safety measures to protect life and property. Severe Weather Awareness Week in Nebraska was March 14-18, and will be April 18-22 in Wyoming. During these two weeks, the National Weather Service will address severe weather topics and test communication systems for relaying potentially life-saving warnings to the public.

Of the estimated 100,000 thunderstorms that occur annually, about 10 percent are classified as severe. Severe thunderstorms produce hail one inch in diameter or larger, damaging winds of 58 mph or higher, and occasionally tornadoes. Hail is produced when thunderstorm updrafts carry water droplets above the freezing level. Hailstones grow until they become too heavy for the updraft to support them and fall to the ground. The largest hailstone fell on July 23, 2010, in Vivian, SD. It measured eight inches in diameter and weighed nearly two pounds.

Another threat is damaging winds, often caused by downbursts. A downburst is a small area of rapidly descending air beneath a thunderstorm, which spreads in all directions at the surface. Downbursts and resulting straight line winds in excess of 125 mph can create damage comparable to a tornado.

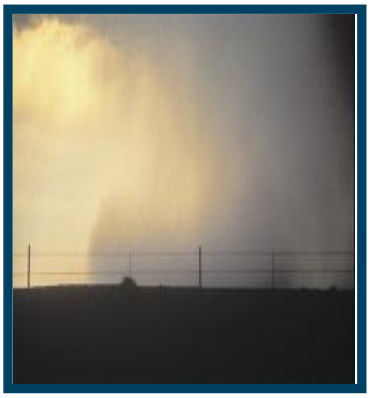
A tornado is a violently rotating column of air extending from the base of a severe thunderstorm in contact with the ground. They can develop anytime, produce winds greater than 200 mph, move randomly, and strike with little or no warning. Tornadoes are classified as weak, strong and violent. Strong and violent tornadoes account for nearly 95 percent of all fatalities.

All thunderstorms produce lightning, and if you are close enough to hear thunder, lightning may be about to strike. Nationwide, between 50 and 60 are killed each year. Lightning causes more than $1 billion in insured losses.

On average, more people are killed by flooding than any single hazard. Most of the deaths occur when people are trapped in their vehicles, and at night, when it is more difficult to recognize flood dangers.

A watch is issued when conditions are favorable for severe weather in and close to the watch area. A warning is issued when severe weather has been detected by Doppler radar or reported by storm spotters.

Before severe weather strikes, develop and test your action plan. Identify a place for you and your family to take shelter when severe weather threatens. Keep abreast of the latest weather from www.weather.gov, or listening to NOAA Weather Radio All Hazards.



40 Years

We would like to recognize Thomas Hayden for 40 years of Volunteer Service.

Thank You!

Numerical Weather Prediction

By Mike Jamski

Numerical weather prediction (NWP) utilizes mathematical models of the atmosphere to predict the weather based on current conditions. NWP dates back to the 1950s when computer simulations were used to create the first forecasts. Since then, computers have become more powerful, datasets have increased, and more physical processes are included for model applications, e.g., climate, air quality and wildfire

A variety of methods are used to obtain data for use in NWP; twice daily radiosonde data measuring wind, pressure, humidity and temperature; hourly surface observations; weather satellite data; and pilot reports. Atmospheric models produce datasets for future times at given locations. Each model utilizes a set of equations to predict the future state of the atmosphere. These equations are initialized from the analyzed data and rates of change are determined. The rates of change predict the atmosphere at future time increments. Time increments range from tens of minutes for global models, e.g., GFS and ECMWF, to five minutes or less for regional models, e.g., WRF and NAM.

The horizontal domains of NWP models are global and regional. Regional models use finer grid spacing than global models, which can resolve smaller-scale phenomena that cannot be represented on the coarser global grid scale. Some meteorological processes are too small-scale or complex to be used in NWP models. Parameterization is a procedure that represents these processes by relating them to variables on scales that the model resolves.

Statistical models were developed by the NWS based upon the three-dimensional fields produced by NWP models, surface observations, and climatological conditions for specific locations. Model output statistics (MOS) can correct for local effects that cannot be resolved by the model due to insufficient grid resolution and biases. MOS parameters include high and low temperatures, probabilities of precipitation, precipitation type, cloud cover, and winds.

Minute errors in numerical model input will double every five days, making it impossible for long-range forecasts to skillfully predict the atmosphere. Ensemble forecasting analyzes multiple forecasts using a single model with varying initial conditions. Multi-model ensemble forecasts have improved long-range predictions compared to the single model approach.

General Flood Safety Tips

- **Stay informed** and keep a battery operated radio for receiving local news and storm information
- **Safeguard possessions** and consider removing them from flood prone areas if time permits
- **Develop an emergency plan** including a safety kit and evacuation route to higher ground if necessary
- **Have a designated location** for family members to meet if they become separated
- **Do not attempt** to drive, walk or swim in flooded areas
- **If you must evacuate** your home turn off all utilities at the main power switch and close the main gas valve if possible

Inside this Issue:

We would like to recognize Mary Beth Evans for 25 years of Volunteer Service.

Thank You!

Winds in Southeast Wyoming

By Kevin Daugherty

There are several causes of high winds in Southeast Wyoming. The most common situation that occurs several times each cold season is when an area of surface low pressure moves from eastern Montana to the northern and central plains. In addition, surface high pressure settles over or near northern Utah. This set produces a large pressure gradient over southeast Wyoming. This means that the pressure changes rapidly from the west portion of the state to the east. The atmosphere can be treated as a fluid, and just as water will move from higher ground to lower ground, the wind blows from the higher pressure to the lower pressure, which is why the strong winds over southeast Wyoming are a westerly direction. Here at the NWS, we studied this gradient and discovered that if the 700 mb height difference between Casper WY, and Craig, CO is 60 meters or more, that strong winds will occur. Using computer models, the forecasters can determine if the gradient is going to exceed this value at least a few days in advance of the strong winds.

Another cause for strong winds is Southeast Wyoming is when there are strong winds aloft, from 1000 to 3000 feet above the ground level. Certain phenomena will cause sinking motions in the atmosphere, such as the right exit or left entrance region of a jet max, negative vorticity advection, or cold air advection. These sinking motions force the stronger winds aloft down to the surface, resulting in wind speeds that reach high wind criteria.

Another cause for strong winds in southeast Wyoming is what we call a Bora Wind. In a bora wind cold air moving into the state from the northwest will be trapped on the west side of the Laramie Range. The Laramie Range acts as a dam. The cold air build up behind the range and when it gets deep enough, it spills over the top of the range and comes rushing down the slopes and onto the plains. A bora wind is a very strong and cold wind.

In addition to weather causes, geographical effects also play a part in causing strong winds in southeast Wyoming. The way the mountain ranges are set up and the physical aspects funnel the winds into certain areas. These are called gap winds. A good example of a location that is affected many times each year by gap winds, is the location from Wheatland to Chugwater.

Finally, the criteria for the NWS to issue a high wind warning in southeast Wyoming is for sustained winds of 40 mph with gusts to 58 mph at the lower elevations. In the mountains, sustained winds of 50 mph with gusts to 75 mph are considered warning criteria wind speeds.

Inside this Issue:

Calendar of Events:

Please see front page for Spotter Training Schedule and check our webpage for updates.

April 18-22: Wyoming Severe Weather Awareness Week
Includes a statewide Tornado Drill on Wednesday, April 21

May 10: Women in Science at University of Wyoming in Laramie
Students in grades 7-12 explore career options in science, math and technology.

May 21, 10AM-3:00PM: Celebration of Wind in Rawlins
Learn about area plans for wind energy, the controversies, employment opportunities and more.

We would like to recognize Lona Nachtman for 25 years of Volunteer Service.

Thank You!

25 Years

We would like to recognize Jack Nielson for 25 years of Volunteer Service.

Thank You!

Inside this Issue:

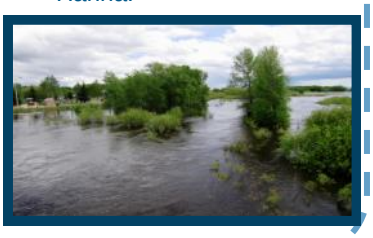
Snowmelt Flood Potential

By Mike Weiland

It is that time of year to start thinking about the upcoming snowmelt and the potential for any flooding. The snowpack in the mountains (mainly the Snowy and Sierra Madre Ranges remain above normal and as of this time, slightly higher than the amounts from this time in 2010. Snowmelt occurs usually from mid May through mid June in the Snowy and Sierra Madre Ranges. Last year, major flooding occurred on the rivers and streams flowing out of those mountains at the end of may through the middle of June. What made 2010 so amazing in regards to flooding was the unusual occurrence of several factors at the same time. Considerable snow was added to the mountains in April and was kept there by cool temperatures through much of May. Then at the end of May, temperatures warmed quickly and then in early June significant rain fell over and near the mountains.

Although, those conditions are not likely to occur at the same time as last year, flooding continues to be a good possibility on rivers and streams flowing from the Snowy and Sierra Madre Ranges in late May and the first half of June. Moderate to High snow melt flood potential exists in late May and early June for the following rivers…

Little Snake River
Laramie River up to Bosler
Little Laramie River
Upper North Platte River up to Sinclair
Encampment River
Medicine Bow River up to Hanna.



North Platte River Water Flows This Spring and Summer

Courtesy of the Nebraska Department of Natural Resources

State Officials provide update on spring snowmelt potential

(Lincoln, NE) High water conditions are occurring along the North Platte River in Nebraska and conditions are expected to continue to intensify throughout the spring, according to Brian Dunnigan, Director of the Department of Natural Resources (DNR), and Al Berndt, Assistant Director of the Nebraska Emergency Management Agency (NEMA).

The U.S. Bureau of Reclamation (USBR) indicates there is limited storage space in the Wyoming reservoirs along the North Platte River and its tributaries to capture all of the expected snowmelt runoff from the mountains in Colorado and Wyoming.

The Natural Resources Conservation Service is reporting snowpack in the Upper North Platte area at 134 percent of average (with some areas having as much as 182 percent of average) and in the Lower North Platte area (including Sweetwater and Laramie rivers) at 114 percent of average.

The total conservation storage capacity of the Wyoming reservoirs is 2,787,800 acre-feet of water. At the end of February, the reservoirs were near their maximum capacity with 2,258,801 acre-feet of water. The estimate of snowmelt runoff potential in the North Platte system above the lowest reservoir is approximately 1,475,000 acre-feet. In response, the Bureau of Reclamation began releasing storage water downstream in early March to make room in the Wyoming reservoirs for expected spring runoff.

In Nebraska, Central Nebraska Public Power and Irrigation District (CNPPID), the owners and operators of Lake McConaughy, are currently bypassing some inflows and are also storing some water in Lake McConaughy. CNPPID may request a temporary variance from the Federal Energy Regulatory Commission to allow an increase in the amount of water that can be stored in Lake McConaughy to help alleviate flooding downstream. In Wyoming, significant releases of water from all reservoirs has been occurring since March 1. This early release of water has already produced high water levels downstream of Guernsey Reservoir.

For more information on the upcoming possible flooding on the North Platte River and its tributaries, please visit the National Weather Service website at http://www.crh.noaa.gov/cys/.

2010-2011 Winter Summary

By Rich Emanuel

Inside this Issue:

25 Years

We would like to recognize Chip Rawlins for 25 years of Volunteer Service.

Thank You!

The winter of 2010-2011 (Which meteorologically is the period December through February) for this region turned out to be quite typical for what is observed during La Nina, the event where water temperatures over the tropical central and eastern Pacific Ocean are cooler than average. La Nina was at moderate to strong strength during the winter but is expected to weaken with the onset of spring.

The winter was characterized by warmer than average temperatures overall during the month of December, near average temperatures for January, and well below average temperatures for February. This pattern of a warm start and cold finish is often seen for this area during La Nina winters. All together the winter was slightly warmer than average across the southern Nebraska panhandle while over the northern Nebraska panhandle as well as southeastern Wyoming overall average temperatures were colder than normal.

Temperatures:

There were approximately 4 significant intrusions of bitterly cold arctic air over the region, the coldest one occurring from about January 31st through February 3rd. That particular outbreak brought some of the coldest temperatures seen in many years and combined with decent winds produced wind chills as low as 60 below zero at Laramie. That was followed a few days later by another very cold period from about February 6th through the 10th. These two outbreaks combined to produce the very cold February overall. It was the 7th coldest February on record for Rawlins while Laramie had their 8th coldest February on record. Rawlins equaled their coldest temperature ever recorded on any day when they fell to 36 degrees below zero on February 2nd. The last time it got that cold there was on February 6th, 1989. Laramie set an all-time record low for the month of February with a low of 39 degrees below zero on February 2nd. That was also Laramie's 5th coldest temperature ever recorded. Shirley Basin, a known cold spot in this area, bottomed out at -49 on February 3rd.

***Precipitation*:**

Winter snowfall turned out to be close to average across the plains while the mountains have received above average snowfall, keeping the water supply outlook in very good shape. Overall snowpack levels in that area were averaging about 120-133% of normal. There were a few decent periods of snowfall over the region outside of the mountains. The most significant storm system brought some moderate to heavy snows and blizzard conditions over the plains during the last couple days in December. Cheyenne received a total of 23.1 inches of snow during the December through February period while Scottsbluff measured 26.6 inches. Total snowfall over the plains for the period ranged from about 15 to 22 inches across the southern Nebraska panhandle to about 24 to 28 inches over the northern Panhandle. Across southeast Wyoming snowfall ranged generally from 20 to 30 inches over the eastern plains to 40 to 45 inches over northern Carbon county, with Shirley Basin reporting a total of just over 49 inches.

***Winds*:**

Anyone who has lived in this area a while knows that winds are a dominant feature during the winter, and this last winter was no exception. Winds tend to be enhanced in this area during La Nina as the atmospheric patterns tend to feature fast winds which reach the surface from time to time. The strongest winds occur mainly over southeast Wyoming in the vicinity of the mountains. Data from Cheyenne indicates that windy days in winter occur about 20-25 percent more during La Nina versus neutral or El Nino events. This last winter didn't have quite so anomalous wind, but was still enhanced. On an overall average, Cheyenne has about 30 days during the December through February time period with wind gusts of at least 40 mph. This last winter Cheyenne recorded 35 days. That was quite a change from last winter when El Nino was occurring and Cheyenne had only 17 days with winds of at least 40 mph.

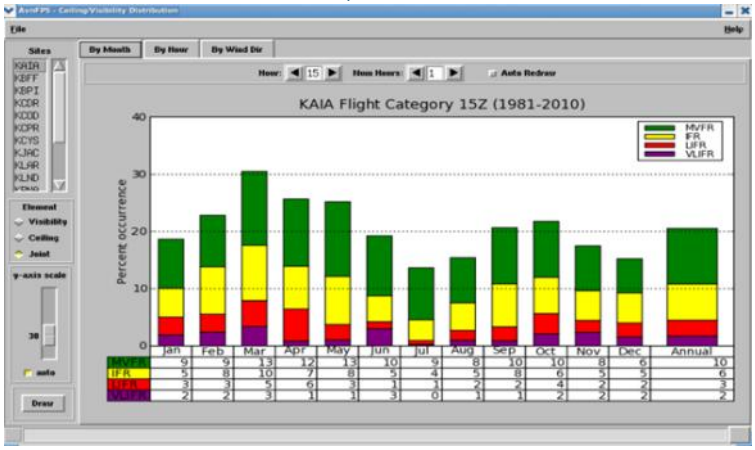
Flight Condition Frequency By Month

By Gerald Claycomb

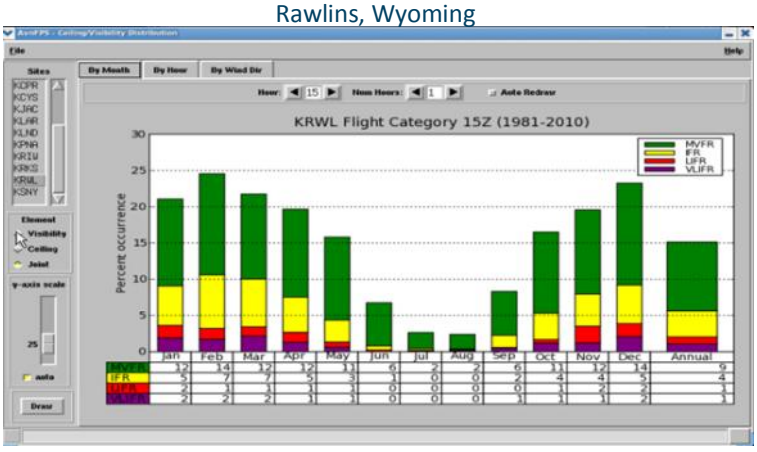
The three graphs below show the frequency of various flight conditions across southeast Wyoming and Nebraska Panhandle. Airports chosen were Alliance, Nebraska, Rawlins and Cheyenne Wyoming. As you can see from the graphs, the spring time is when we experience the most varied flight conditions around this area. For Cheyenne, this variance peaks in April, while Alliance and Rawlins see more of a spike in the January through March timeframe. All three airports see a lull during the summer months of July and August.

Flight category frequency tables are available for all 7 airports serviced by the NWS office at Cheyenne. We also have wind roses for these airports as well. The airports we service are Rawlins, Laramie, Cheyenne, Chadron, Alliance, Scottsbluff and Sidney. If you're interested in obtaining this information, please give us a call. We'd be happy to provide this information, free of charge.

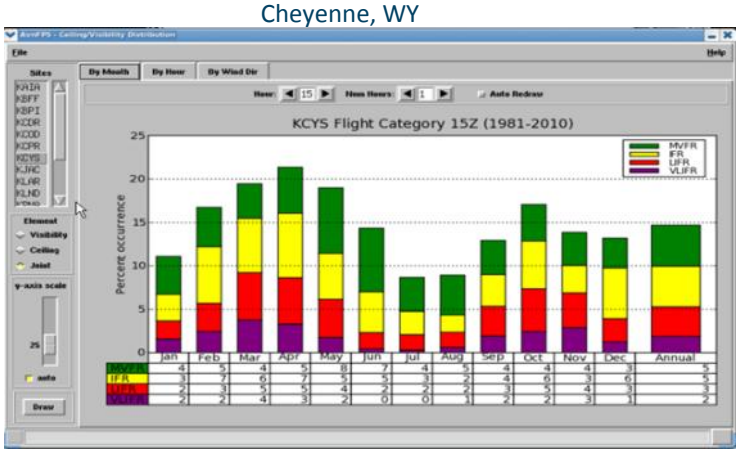
Alliance, Nebraska



Rawlins, Wyoming



Cheyenne, WY



25 Years

We would like to recognize Jennifer Evans for 25 years of Volunteer Service.

Thank You!

Inside this Issue:

Something Worth Talking About

By Ray Gomez

As Frank "Kin" Hubbard (19th century American humorist) famously said, "Don't knock the weather. If it didn't change once in a while, nine out of ten people couldn't start a conversation." we all enjoy talking about the weather. Sunshine or rain, cold or hot, it affects us every day. And while many will not admit it, most of us do look forward to its changes. Subconsciously or not we compare one day to the next, always remembering with pride the days we overcame the "80 mph winds", the "5 ft snowdrifts", or the "110 degree heat".

Yes, those 110 degree days linger in our memories, and because of people taking weather measurements in thousands of places across the globe we have a record of that heat and of the climate of this planet. When you think about it, without this data how else would you know if the new farmland you were considering received enough rainfall to sustain a profitable crop? How would you know the best direction to face your pole barn so that it would not fill with snow most winters?

Such valuable information requires observation. Perhaps you are one of those people that enjoy keeping track of temperature, or severe weather, or rain/snow fall. If you are, there are several ways that you can join the honorable profession of weather/climate observers. Today, people with a computer, a telephone, and a few instruments can add their measurements to those of many others to create a near real-time snapshot of the weather throughout the world. In the US there are several weather observing networks, three of which are CoCoRaHS, NeRAIN, and eSpotter.

CoCoRaHS (pronounced "Coe Coe Raws") stands for the Community Collaborative Rain, Hail and Snow Network. Its purpose is to utilize volunteer observers to measure and record precipitation data (rain, hail, and snow). It started at Colorado State University in 1998, but now has volunteers nationwide. This network has excellent training for the new observer, and all your measurements can be transmitted via regular phone, or the internet if you have a computer. You will need to purchase, or already have at your disposal a rain gage for your measurements. If you wish to measure hail, you will have to pickup and return "hailpads" (one foot square pieces of Styrofoam covered with aluminum foil) from/to your coordinator.

According to the CoCoRaHS website the precipitation data you collect: "...is used by a wide variety of organizations and individuals. The National Weather Service, other meteorologists, hydrologists, emergency managers, city utilities (water supply, water conservation, storm water), insurance adjusters, USDA, engineers, mosquito control, ranchers and farmers, outdoor & recreation interests, teachers, students, and neighbors in the community..." As a result your contributions to this endeavor benefit interests far beyond your backyard. Your work makes a difference!

If you would like more information on CoCoRaHS, visit their website at: www.cocorahs.org, or call your state coordinators. In Wyoming that is Michael Weiland or Arthur Hutcheon, National Weather Service, Cheyenne, WY 307 772 2468. In Colorado the contact is Chad Gimmestad, National Weather Service, Boulder, CO 303 494 4221. In Northwest Kansas it is David Thede, National Weather Service, Goodland, KS 785 899 2360.

NeRAIN (pronounced "N E Rain") stands for the Nebraska Rainfall Assessment and Information Network. It is a precipitation measuring system that is Nebraska's alternative to CoCoRaHS. It is sponsored by the State, which will supply you with the gage equipment you will need for your observations. Daily reports are made over the Internet, so you will also need a computer and a 'net connection. Information about and excellent training for NeRAIN is supplied via this organization's website located at: dnrdata.dnr.ne.gov/NeRAIN.

NeRAIN is divided into regions corresponding to major river basins. In the Nebraska Panhandle there are three distinct areas. To volunteer, contact the coordinator for your area. For the Upper Niobrara/White River basin (Northern Sioux, Dawes, Box Butte and Sheridan counties), email Sheri Daniels at: daniels@unwnrd.org. For the North Platte basin (Southern Sioux, Scotts Bluff, Banner, Morrill and Garden counties), email Greg Jackson at: jackson@npnrd.org. For the South Platte basin (Kimball, Cheyenne, and Deuel counties), email Chris Kaiser at: ckaiser@spnrd.org.

The last weather observing network is called eSpotter and it is not a precipitation reporting platform, but a severe weather reporting tool. During times of tornado, severe thunderstorm, severe winter weather or flooding, real-time reporting from trained citizens is an invaluable tool for National Weather Service meteorologists. eSpotter reports are received in NWS offices via computer and are read by on-duty staff. This information greatly assists NWS personnel in updating weather watches and warnings as events unfold. In this way trained eSpotter personnel directly impact and benefit their communities by helping the NWS and local emergency management save lives and property.

Because of the importance of this system, its current intention is for trained observers and emergency management personnel. You can obtain training very easily by attending one of many Observer/Spotter training courses given each year by your local National Weather Service office. For example, in 2011 for the Southeast Wyoming and the Nebraska Panhandle, spotter courses are being held in the Nebraska towns of: Chadron, Kimball, Alliance, Sidney, Ft. Robinson, and Bayard. In Wyoming courses are being held in: Douglas, Pine Bluffs, Torrington, Cheyenne, and Wheatland.

Likewise if severe weather excites you, the eSpotter program provides highly valued information in critical conditions when seconds count. Attending a spotter session is a local event which brings together many people that have the same interest in the weather as you for an enjoyable evening of study and discussion.

Inside this Issue: